Small Business Innovation Research/Small Business Tech Transfer

Prognostic and Fault Tolerant Reconfiguration Strategies for Aerospace Power Electronic Controllers and Electric Machines, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

Impact Technologies proposes to develop a real-time prognostic and fault/failure accommodation system of critical electric power system components including power converters and electro-mechanical drives for the aerospace and aeronautical industry. The innovation of project is focused on the integration of emerging prognostic technologies with fault tolerant methodologies to improve system reliability and mission readiness for NASA's next generation electrical power systems. The proposed concept will utilize incipient fault detection techniques to provide longer predicted horizons prior to failures, and time to trigger the appropriate reconfiguration scheme. Impact Technologies' approach uses fault detection circuits and algorithms to analyze data from several sources including electrical and environmental measurements, model estimates, and usage conditions. Up-to-date assessments of the electrical system health and remaining useful life of critical components will be made possible via an on-board embedded processing system, which continuously updates prognostic models with sensed data and predicts the best fault accommodation strategy to meet mission objectives. The proposed electrical system fault prognosis and accommodation approach will be demonstrated with a Motor/Generator/Drive test bench adapted for use in this program and with data from the modern aerospace power system and electromechanical actuators.

Anticipated Benefits

The potential commercial use of the developed technologies is broad. Examples of key customers that could benefit through use of the developed technologies include: unmanned combat air vehicles, JSF, future combat systems, commercial airlines, land and marine propulsion systems, industrial actuation systems, and robotic applications. The aero propulsion domain alone has thousands of potential systems to address with this technology.

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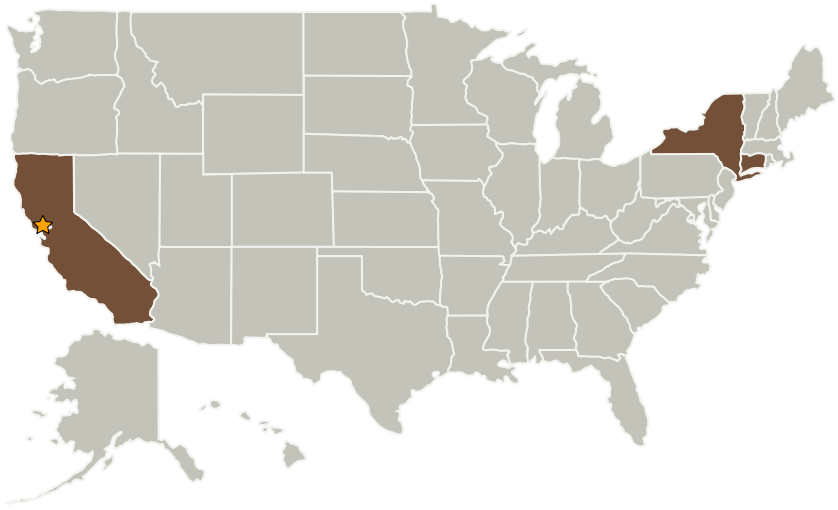
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Impact Technologies, LLC	Supporting Organization	Industry	Rochester, New York
Sikorsky Aircraft Corporation	Supporting Organization	Industry	Stratford, Connecticut

Primary U.S. Work Locations	
California	Connecticut
New York	

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Scott Poll

Principal Investigator:

Myra Torres

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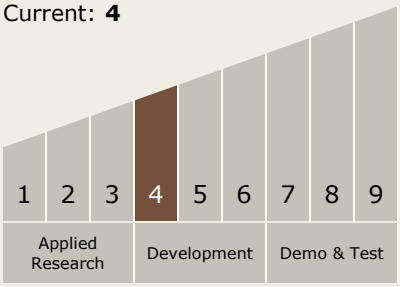
Technology Maturity (TRL)

Start: **4**
Current: **4**



Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.6 Advanced Life-Cycle Testing Techniques